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# MetaMap Demo Notes

- General

maps text to concepts (equivalently, finds concepts in text allowing for normalization of text)

characteristics: knowledge intensive, minimal commitment parsing, principled evaluation

normal processing vs. term processing (correctness vs. breadth)

process: parsing, variant generation, candidate retrieval, candidate evaluation, mapping construction

access: interactive, batch, API

conversion to C (term processing) for vocabulary study

- MetaMap options

- Examples

normal processing: *lung cancer*

variants: (-v) *lung cancer*

compound and multiple mappings: *obstructive sleep apnea*

term processing: (-zogm) *thrombolysis*

use of threshold: (-zog -r 500) *continuous pump-driven hemofiltration*

full utterance: *Physical fitness is a major determinant of femoral neck and lumbar spine bone mineral density.*

- MetaMap options

```

lan@nls3> metamap -h

MetaMap (Meta 95)

Usage: metamap [<options>] [<infile>] [<outfile>] [<tagfile>]

<infile> contains labelled utterances (default is user_input),
<outfile> is a file for results (default is <infile>.out),
and <tagfile> is an optional tag file.

metamap options:
[DEFAULT] -t --tag_text
           -z --term_processing
           -o --allow_overmatches
           -g --allow_concept_gaps
           -a --no_acros_abbrs
           -u --unique_acros_abbrs_only
[DEFAULT] -l --stop_large_n
[DEFAULT] -b --best_mappings_only
           -r --threshold <integer>
           -j --mesh_projection
           -q --machine_output
[DEFAULT] -p --plain_syntax
           -x --syntax
           -v --variants
           -f --full_variants
[DEFAULT] -c --candidates
           -n --number_the_candidates
[DEFAULT] -s --semantic_types
[DEFAULT] -m --mappings
           -h --help
           -i --info
           -d --dump_timing
           -w --warnings
           -y --dump_stats
           -0 --debug0
           -1 --debug1
           -2 --debug2
           -3 --debug3
           -4 --debug4
           -5 --debug5
           -6 --debug6

lan@nls3>
```

*Warning:  
Subject to change*

Figure 1. MetaMap options

- 
- Normal processing: *lung cancer* (term processing retrieves 1,202 candidates)

```
lan@nls3> metamap
MetaMap (Meta 95)

Control options:
tag_text
stop_large_n
best_mappings_only
plain_syntax
candidates
semantic_types
mappings

sentence: lung cancer
:

Processing lung cancer

Phrase: lung cancer
Meta Candidates (7):
1000 Lung Cancer [Disease or Syndrome]
861 Cancer [Disease or Syndrome]
694 Lung [Body Part, Organ, or Organ Component]
638 Pulmonary <1> (Pulmono-) [Body Part, Organ, or Organ Component]
638 Pulmonary <2> [Intellectual Product]
601 Pneumonia [Disease or Syndrome,Finding]
601 Pulmonary Artery [Body Part, Organ, or Organ Component]
Meta Mapping (1000):
1000 Lung Cancer [Disease or Syndrome]

sentence:
:
lan@nls3>
```

Figure 2. *Lung cancer* using normal processing

- Variants: (-v) *lung cancer*

```

lan@nls3> metamap -v
MetaMap (Meta 95)

Control options:
tag_text
stop_large_n
best_mappings_only
plain_syntax
candidates
semantic_types
mappings
variants

sentence: lung cancer
:

Processing lung cancer

Phrase: lung cancer
lung variants (n=16):
arteria pulmonalis[9="sdss"] arterial vein[9="sdss"] lung[0=[]]
lungs[4="ss"] peripneumonia[7="sds"] peripneumonitis[9="sdss"]
pneumal[2="s"] pneumonia[5="sd"] pneumonic[2="s"] pneumonic
fever[7="sds"] pulmonal[4="ss"] pulmonary[2="s"] pulmonary
artery[5="sd"] pulmonary fever[7="sds"] pulmonic[2="s"] truncus
pulmonalis[7="sds"]

cancer variants (n=7):
ca[2="a"] can[5="ad"] cancer[0=[]] cancerous[3="d"] cancriform[3="d"]
carcinomatous[2="s"] carcinous[4="ss"]

Meta Candidates (7):
1000 Lung Cancer [Disease or Syndrome]
861 Cancer [Disease or Syndrome]
694 Lung [Body Part, Organ, or Organ Component]
638 Pulmonary <1> (Pulmono-) [Body Part, Organ, or Organ Component]
638 Pulmonary <2> [Intellectual Product]
601 Pneumonia [Disease or Syndrome,Finding]
601 Pulmonary Artery [Body Part, Organ, or Organ Component]
Meta Mapping (1000):

```

Figure 3. Variants of *lung* and *cancer*

- 
- Compound and multiple mappings: *obstructive sleep apnea*

```
lan@nls3> metamap
MetaMap (Meta 95)

Control options:
tag_text
stop_large_n
best_mappings_only
plain_syntax
candidates
semantic_types
mappings

sentence: obstructive sleep apnea
:

Processing obstructive sleep apnea

Phrase: obstructive sleep apnea
Meta Candidates (7):
 913 Apnea, Obstructive [Disease or Syndrome]
 901 Apnea, Sleep [Disease or Syndrome]
    Apneas, Sleep
 827 APNOEA (Apnea) [Disease or Syndrome,Finding]
 827 Sleep [Mental Process,Organism Function]
 755 Sleeplessness (Insomnia) [Finding,Mental or Behavioral Dysfunction,Sign or Symptom]
 755 Sleepy (Somnolent) [Sign or Symptom]
Meta Mapping (901):
 901 Apnea, Sleep [Disease or Syndrome]
Meta Mapping (901):
 913 Apnea, Obstructive [Disease or Syndrome]
 827 Sleep [Mental Process,Organism Function]
```

Figure 4. Mappings for *Obstructive sleep apnea*

- Term processing: (-zogm) *thrombolysis* (normal processing returns nothing)

```

lan@nls3> metamap -zogm
MetaMap (Meta 95)

Control options:
tag_text
stop_large_n
best_mappings_only
plain_syntax
candidates
semantic_types
term_processing
allow_overmatches
allow_concept_gaps

sentence: thrombolysis
:

Processing thrombolysis

Phrase: thrombolysis
Meta Candidates (14):
 833 Thrombolysis, Therapeutic (Thrombolytic Therapy) [Therapeutic or Preventive Procedure]
 761 Thrombolytic Agents (Fibrinolytic Agents) [Pharmacologic Substance]
 714 Thrombolysis of coronary artery by intravenous infusion [Therapeutic or Preventive Procedure]
 696 Thrombolysis of coronary artery by intracoronary infusion, including selective coronary angiography [Diagnostic Procedure]
 678 Intracoronary artery thrombolytic infusion (Injection of thrombolytic agent direct into coronary artery) [Therapeutic or Preventive Procedure]
 650 Intra-arterial infusion of thrombolytic agent [Therapeutic or Preventive Procedure]
 628 SINGLE VESSEL PERCUTANEOUS TRANSLUMINAL CORONARY ANGIOPLASTY (PTCA) WITH THROMBOLYTIC AGENT [Therapeutic or Preventive Procedure]
 628 Single vessel percutaneous transluminal coronary angioplasty with thrombolytic agent infusion [Therapeutic or Preventive Procedure]
 625 Infusion of intra-arterial thrombolytic agent with percutaneous transluminal coronary angioplasty [Therapeutic or Preventive Procedure]
 625 Single vessel percutaneous transluminal coronary angioplasty without mention of thrombolytic agent [Therapeutic or Preventive Procedure]
 623 Removal of coronary artery obstruction by percutaneous transluminal balloon with thrombolytic agent [Therapeutic or Preventive Procedure]
 623 SINGLE VESSEL PERCUTANEOUS TRANSLUMINAL CORONARY ANGIOPLASTY (PTCA) WITHOUT MENTION OF THROMBOLYTIC AGENT [Therapeutic or Preventive Procedure]
 620 Infusion of intra-arterial thrombolytic agent with percutaneous transluminal coronary angioplasty, multiple vessels [Therapeutic or Preventive Procedure]
 620 Infusion of intra-arterial thrombolytic agent with percutaneous transluminal coronary angioplasty, single vessel [Therapeutic or Preventive Procedure]

```

Figure 5. *Thrombolysis* using term processing

- Use of threshold: (-zog -r 500) *continuous pump-driven hemofiltration* (246 candidates if no threshold)

```
lan@nls3> metamap -zog -r 500
MetaMap (Meta 95)

Control options:
tag_text
stop_large_n
best_mappings_only
plain_syntax
candidates
semantic_types
mappings
term_processing
allow_overmatches
allow_concept_gaps
threshold=500

sentence: continuous pump-driven hemofiltration
:

Processing continuous pump-driven hemofiltration

Phrase: continuous pump-driven hemofiltration
Meta Candidates (10):
750 Hemofiltration [Therapeutic or Preventive Procedure]
722 Hemofiltration, Continuous Arteriovenous (CAVH) [Therapeutic or Pre-
    ventive Procedure]
583 Arteriovenous Hemofiltration [Therapeutic or Preventive Procedure]
583 Extracorporeal hemofiltration, NOS [Therapeutic or Preventive Proce-
    dure]
583 Hemofiltration Units [Medical Device]
583 Venovenous Hemofiltration [Therapeutic or Preventive Procedure]
549 Drive [Mental Process]
549 Pumps [Medical Device]
500 CONTINUOUS INSULIN INFUSION PUMP [Medical Device]
500 Drivers [Medical Device]
Meta Mapping (916):
722 Hemofiltration, Continuous Arteriovenous (CAVH) [Therapeutic or Pre-
    ventive Procedure]
549 Pumps [Medical Device]
549 Drive [Mental Process]
```

Figure 6. *Continuous pump-driven hemofiltration* with a threshold

- Full utterance: *Physical fitness is a major determinant of femoral neck and lumbar spine bone mineral density*

```

lan@nls3> metamap
MetaMap (Meta 95)

Control options:
tag_text
stop_large_n
best_mappings_only
plain_syntax
candidates
semantic_types
mappings

sentence: Physical fitness is a major determinant of femoral neck and
: lumbar spine bone mineral density.
:

Processing Physical fitness is a major determinant of femoral neck and lum-
bar spine bone mineral density.

Phrase: Physical fitness
Meta Candidates (6):
1000 Physical Fitness [Qualitative Concept]
861 Physical [Biomedical Occupation or Discipline]
789 Fit, NOS (Seizures) [Disease or Syndrome,Sign or Symptom]
789 Physic (Physics) [Occupation or Discipline]
761 Physician (Physicians) [Professional or Occupational Group]
755 Physicists [Professional or Occupational Group]
Meta Mapping (1000):
1000 Physical Fitness [Qualitative Concept]

Phrase: is
Meta Candidates (0): <none>
Meta Mapping: <none>

Phrase: a major determinant
Meta Candidates (2):
761 determination [Laboratory Procedure]
694 Major [Qualitative Concept]
Meta Mapping (838):
694 Major [Qualitative Concept]
761 determination [Laboratory Procedure]

Phrase: of femoral neck
Meta Candidates (7):
964 Femur Neck [Body Location or Region]
861 Neck [Body Location or Region]
827 Necking [Social Behavior]
805 Cervical [Body Part, Organ, or Organ Component]
768 Cervix (Cervix Uteri) [Body Part, Organ, or Organ Component]
638 Thigh [Body Location or Region]
623 Femur [Body Part, Organ, or Organ Component]
Meta Mapping (964):
964 Femur Neck [Body Location or Region]
(Continued below)

```

**Figure 7.** *Physical fitness is a major determinant of femoral neck and lumbar spine bone mineral density.*

Phrase: and  
Meta Candidates (0): <none>  
Meta Mapping: <none>

Phrase: lumbar spine bone mineral density.  
Meta Candidates (11):

- 884 Bone Mineral Density (Bone Density) [Laboratory or Test Result, Quantitative Concept]
  - Bone Density
- 804 Bone (Bone and Bones) [Body Part, Organ, or Organ Component, Tissue]
- 804 Bone Mineralization (Calcification, Physiologic) [Organ or Tissue Function]
- 804 Bone, NOS (Skeleton) [Body System]
- 804 density [Quantitative Concept]
- 804 mineral (Minerals) [Inorganic Compound]
- 748 OS (Opening snap) [Finding]
- 733 Mineralization [Acquired Abnormality]
- 673 Lumbar spine (Lumbar Vertebrae) [Body Part, Organ, or Organ Component]
- 637 Spine [Body Part, Organ, or Organ Component]

Meta Mapping (893):

- 673 Lumbar spine (Lumbar Vertebrae) [Body Part, Organ, or Organ Component]
- 884 Bone Mineral Density (Bone Density) [Laboratory or Test Result, Quantitative Concept]

Figure 7. (Concluded)